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AUTOMOTIVE MANUFACTURING TAKES SHAPE

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Chilton's
AUTOMOTIVE INDUSTRIES

January, 1983/Volume 163, Number 1

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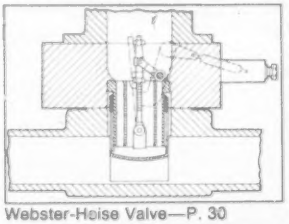
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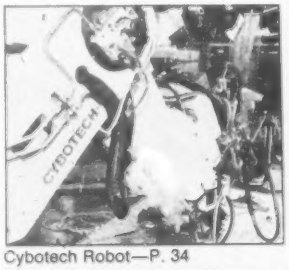

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The 20th awarding of *AI's* Man of the Year goes to Chrysler's Lee Iacocca. Also—Quality: what, how and where?

QUOTABLE

Borg-Warner's Thomas Hague, who spent 10 years as a supplier executive in Japan, describing the three-tier supplier industry there—"The only thing keeping it in gear is the terrible incremental apprehension that there might be a five minute delay in delivering the perfect product to that production line."

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"Some day, these will be common in the industry. Today, they are rare. Detroit Gear and Axle has one going in, we know of a couple in Italy, and that's about it," Streng adds.

"These are extremely expensive systems, and they are only suited to the medium-volume level."

The question becomes cost versus benefits. Some of these flexible machining systems cost five to six times as much as hard tooling. A company could almost afford to buy and re-buy hard tooling a few times. "What we have to do is work to get the cost of these systems down," says Streng, "then the improved machine utilization they offer would be a factor in favor of the FMS."

Newer, more flexible solutions are also available for higher volume parts. These are the flexible transfer lines. They deal with more of a batch/random process than do typical FMS, and with smaller families of parts.

"Even though the automotive industry has changed tremendously, it still needs relatively high volumes of parts," says Cross's Bastow. "You may not see them running 200 an hour of the same V-8 engine for two or three shifts all year like they did 10 years ago, but you will see them running threes, fours and sixes in blocks or heads down the same type of equipment.

"And, when they're running a given size, they are running it at 120 or 150 per hour. This is what a truly flexible transfer system can do."

In the past, it was not uncommon for transfer lines to run a couple of different parts, but typically the changeover was of a manual nature and was made on a planned schedule. Because of the flexibility now built into these lines, changeover can be done with very little manual labor.

"With numerically controlled stations, instead of changing heads or changing tools manually, we can index a new one into position or we can change tools with a tool changer. And, we can control all that through the microprocessor," says Bastow.

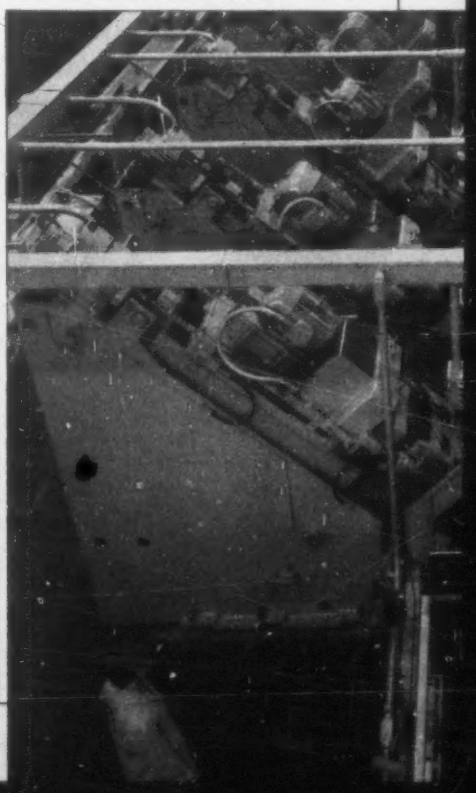
Cross has just shipped a line that can handle three-, four- and six-cylinder diesel engine blocks in a variety of batches. It is equipped with a monitor which tells which part the line is running. It can even be running four-cylinder models on the end of the line while three-cylinder parts are entering the system. That's flexibility!

This particular system has been installed at Consolidated Diesel to make diesel engines for small trucks and farm vehicles. Electronic monitors at each Cross machine on the line and on other equipment communicate to the system monitor controller to provide up-to-the-minute information about tool change schedules and fault conditions by machine. This allows management to make timely, informed assessments of system conditions.

The monitoring system, called Sentry III, utilizes a network of Modicon programmable controllers communicating through a Modbus industrial communication system. It is easily expandable to keep up with changing production parameters.

Another transfer line development from Cross Co. is called Flexcycle. With this control system, only those machining units of a transfer line with parts present at their stations will cycle. When the controlling unit is not required to cycle, total machine cycle time is reduced and throughput can be increased.

"Flexible manufacturing will be a major element in automotive," says Chet Maccio, vice president of sales



A synchronous free-part lift and carry machine from Cross Co. drills the banks of heavy cast-iron V8 diesel blocks.

US Vs. Japanese Assembly Productivity

Since 1978 the US auto industry has been involved in the most massive revamping in its peace-time history.

Old, multi-story factories have been closed and replaced with sprawling, robotized complexes that are chock full of computerized machine tools and test equipment. Many industrialists have predicted that these brand new plants will allow the American auto industry to regain its historical productivity edge.

But a comparison between the most modern assembly plants in the US and Japan suggests that this may not be the case. Indeed, the facts suggest the Japanese are actually increasing their productivity advantage.

The basis for this assumption is a comparison of GM's Hamtramck assembly plant, which is expected to start building the E-body fwd luxury cars (Olds Toronado, Buick Riviera, Cadillac Seville and Eldorado) in the fall of 1985, and Toyo Kogyo's Hofu City plant. TK's plant started building the fwd model 626 last fall.

Assembly plants were chosen for the comparison because they generally perform the same operations, that is to say that they assemble roughly equivalent amounts of components.

It should also be noted that both plants use the same number of robots, about 155, and that all the Hofu City figures include an on-site stamping plant. GM's nearest stamping plant to Hamtramck is in Grand Rapids, MI—200 mi (322 km) away.

Toyo Kogyo is able to build a smaller plant by eliminating all warehouses and using a kanban system of inventory control. Seats and windshields are delivered every 30 minutes; mid-size parts are delivered from one to eight times a day; and only a two-hour supply of engines are kept on hand.

In addition, TK's die change time is 5 minutes, with a goal of 3 minutes. As a result of these and other efficiencies, Toyo Kogyo requires less than half the man hours of labor to assemble an automobile.

One thing that must be kept in mind is that the investment, employment and capacity levels cited for GM's Hamtramck plant are pre-

GM's & TK's Assembly Compared

	GM Hamtramck (Detroit)	TK Hofu City (Hiroshima)
size	3.2 million ft² (297,600 m²)	1.5 million ft² (139,500 m²)
investment	$600 million	$150-180 million (35,000 million yen)
employment (direct & indirect)	6000	1800 (including stamping plant)
capacity	1120 cars/day	1000 cars/day (not including 350 CKD units/day)
productivity*	42.8 hours/car (40 hours/car assuming 5% absenteeism	14.4 hours/car

Productivity, or man-hours of labor per car, is determined by multiplying total employment by 8 hours to get total man-hours per day. This figure is then divided by total production per day.

liminary and could change in the future. Also, the GM luxury cars will be more complex and will require more components. In addition, the city of Hamtramck is preparing an industrial park that will help suppliers deliver components on a just-in-time basis.

Nonetheless, it would appear that Japan's newest assembly plant is more than twice as efficient. ■

—John McElroy

for Snyder Corp. "Because automotive can't afford to make these extremely costly model changes or capital expenditures. They are going to be more conscious of being able to re-use the equipment they buy today and of having the ability to run a family of parts.

"We have been involved in several quotations to automotive where we have proposed flexible manufacturing systems both independently and in conjunction with our corporate manufacturing group, the Giddings & Lewis [G&L] organization," says Maccio.

An example is a machining system which would accommodate two different size manifolds for two different size engines with a minimum amount of retooling.

"We would take an intake manifold transfer machine," Maccio explains, "then incorporate a control, then Gilman-type transporting equipment [Gilman is also part of G&L], and then Snyder-type machining units, and marry that together to form a machining complex for intake manifolds.

"We could add a machining center if it is required, with tool change characteristics, automatic gaging, automation part probing, identification, etc. We are in a unique position in that we can provide all this technology from one corporation," says Maccio.

Maccio sees flexible manufacturing systems as less suitable for engine blocks and cylinder heads than for manifolds which can change yearly because of Government regulations for pollution control or for service parts over a long period.

G&L has four systems going in off-highway and power transmission applications. And the GM Tech Center is aggressively looking at this technology, says Maccio. But, in these economic times, when people are reducing their expenditures, it is difficult to sell technology.

"We are involved in some minor retooling now where our equipment will make engine parts more effective and less expensive," he adds.

Automakers concur in the need for flexibility. "We think that flexibility is important and will become more important as time goes on, because it is becoming obvious that we are going to need to respond more quickly to shifts in market demands," says Paul Ayres, director of production engineering at Cadillac. "In order to respond, we will have to be as flexible as possible in our assembly facilities as well as in our manufacturing facilities."

The equipment changes are probably most profound in assembly in the body in white area. That is where Cadillac anticipates the greatest changes as major model changes occur.

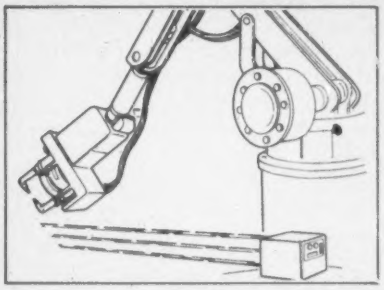
"In cooperation with Fisher Body, we have developed a series of plans for flexible automated body shops. And as we undergo major model changes year by year, we plan to install these flexible facilities," says Ayres.

These plans rely heavily on the ability to change fixturing which is dedicated to the particular style or model relatively quickly. They will include flexible welding with robots so that changeovers become a matter of reprogramming rather than physically changing a great deal of tooling. The Robogate system currently installed in Janesville is an example of flexibility which will reap paybacks over the coming years.

Changes are underway now. Janesville is an example. The Orion plant and the Wentzville plant, now under construction, will continue the trend.

(Continued)

JOINING THE ROBOT CIRCUS



NOW OR NEVER ???????

Your multi-million dollar automation scheme fell sour and now you have a tribe of rogue robots either self-destructing around you or trying to weld the foreman's pants to his shoes every other millisecond. What went wrong? Here are some tips.

While US manufacturers in general and automakers in particular are caught up in a mad wind sprint toward robotics, quite a few runners are stumbling due to inadequate preparation and lack of organization.

How can the fledgling robot user determine how much he actually needs a robot system and what guidelines should be followed in developing, installing and implementing the system that is to be adopted?

The following, drawn up by William Finch, executive director of advanced manufacturing technologies for The Princeton Group Inc., Princeton, NJ, are a number of considerations to be taken into account before your company joins the robotics circus.

• Don't jump headfirst into robotics just because without them you feel the world is passing you by. Robots may not be a proper fit with your needs. Ask what your real interest is—to have a robot as a symbol of the "progressive-mindedness" of your company, or do you want a practical automated system, one that serves you well, while the equipment that it involves remains an important but very secondary consideration.

• Don't commit yourself to a selection of equipment and then find an application to fit it.

• Don't think all you have to do is underwrite the cost of a robotic installation and then assume that the rest of the problem will take care of itself. Consider, if you were to improve the construction of a new plant, you would certainly recognize the parallel responsibilities for resolving all present and future needs attendant on such an important step.

• Don't think that a robot is a magical machine that will eliminate all your production problems. A robot is only a tool that must be used as exactly that and not as an end in itself.

• Don't put your manufacturing manager in the position of having to be an expert in the selection of a robot installation just because the plant has resorted to him in the past. In self-defense he may end up having to rely

Big Squeeze Hits Robot Market

In the past two years anything marked robotic drew interest and opened corporate pocketbooks. But the big squeeze has hit. The luxury of spending capital on robots has ground to a halt.

Ransburg Corp.'s performance on the New York Stock Exchange provides a good example of the roller coaster robot market the last two years.

Ransburg's stock value tripled almost immediately after it formed a joint venture with Renault in 1980 called Cybotech Corp. Now its stock value has dropped even though Ransburg's chairman, Don Kacek, says the long-term market potential looks bright.

"The long-term outlook is good" says Kacek. "But when you have very restricted capital expendi-

Ransburg Corp. chairman, Don Kacek, left, watches a company engineer put a Cybotech welding robot through its paces. Ransburg and Renault formed Cybotech in 1980.

tures, you tend to buy only those things that are absolutely necessary. You have to buy the things necessary to keep the plant moving, but that certainly doesn't include robots. As a result, the robot business has been hit harder than the general capital equipment business."

There are still companies, however, that have been drawn to robots because of their glamour. Sometimes you have to turn down those companies even though it could mean thousands of dollars in Ransburg's kitty, according to Kacek.

Kacek emphasizes that the companies which buy robots to keep up with the competition often don't know where or how to use them. This eventually turns a happy customer into an angry purchaser.

In addition, Kacek says, "The automotive industry has bought a lot of equipment from the big robot suppliers earlier. And it's our understanding that some of that equipment hasn't even been put into service yet." ■—*Michael K. McCann*

Robot Growth

Robots In Use (units)

ITEM	1972	1977	1980	1985	1990	1995
Coating	60	300	750	4400	17000	40000
Welding	415	1100	1820	8000	28000	65000
Spot Welding	415	1050	1700	4800	11000	24000
Arc Welding	—	50	120	3200	17000	41000
Material Handling	360	790	1795	12100	42600	113000
Pick-and-Place	200	325	880	3900	14000	40000
Palletizing	40	140	240	1200	4600	18000
Machine Loading	120	325	675	7000	24000	55000
Processing	80	260	728	5700	27000	97000
Parts Finishing	80	230	530	3000	11000	35000
Assembly	—	30	180	2300	13000	50000
Inspection	—	—	18	400	3000	12000
Total Sales	**915**	**2450**	**5093**	**30200**	**114600**	**315000**

Source: Predicasts, Inc.; Cleveland, Ohio 8/82

According to a report developed by Predicasts Inc., there will be 315,000 robots in American industry by 1995. The report estimates that robotic industry sales will increase from $89 million in 1980 to $600 million in 1985 and to $4 billion in 1995.

too much on the machine tool manufacturer whose machines he has used up to now. Your machine tool manufacturer's equipment may not represent the best possible choice.

• Don't believe everything the robot manufacturer's salesman tells you. You know more about your business than anyone, so don't rely on him totally for application engineering and installation.

• Don't blame the robot for every problem that arises with the new system. The equipment with which the robot interfaces may be the culprit.

• Don't expect vendors to furnish turnkey implementations. You're looking for an integrated robot system that will interface with your other machines. Since you know more about your plant than the vendor does, you must be just as reponsible as the vendor for the implementation.

• Don't forget people requirements. The robot may displace the machine operator, but people are needed to program and maintain the robots.

The list of considerations Finch says you should make are as follows.

• Recognize that a vastly improved automated factory system involving costly and complicated equipment must have appropriate direction by and policy guidance from the top. This involvement is needed to reflect an adequate understanding of the total needs of corporate, divisional and/or functional executives.

• Recognize that without proper planning and the time and money that this requires, your new systems will inevitably fall short of their original objectives and promises.

• Identify the application first and then, and only then, determine the type of equipment needed to operate it effectively.

• Ideally, start implementing robots in environmentally hostile areas, such as where you have experienced Workmen's Compensation cases or have received OSHA citations.

• Keep it simple. Start with the simplest applications where the risk of failure is lowest, even if the return on investment is not as promising as that projected on more sophisticated ones. You want a success upon which to build.

• Have your own people participate in the development of the system where their contributions can be worthwhile. As participants they will not only accept the many changes that will be necessary, but they will also be informed to the point of knowing how to work with the robot system once it has been installed and is operating.

• Think carefully about the manner in which your plant is to be organized. In time your operations will be largely run with robots which will have displaced much of your human labor force. Will you need the layers of plant management and foremen that you now have? ■

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NORTH AMERICAN

Special Supplement
British Automotive Technology

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Lee A. Iacocca
Chairman
Chrysler Corp.

Man Of The Year 1983

Part I of III
How To Measure Quality

Robots Spark TK's Output

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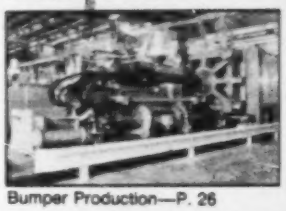

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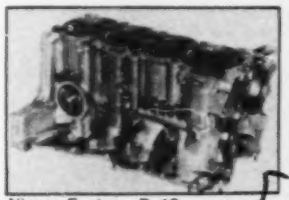

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COVER

Chrysler chairman Lee A. Iacocca, *AI's* Career Achievement winner for 1983.

NEXT MONTH

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QUOTABLE

"Gains will look big for us next year only because we will be lifting off from Ground Zero in 1982."—US metalworking industry executive.

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Car/Truck Sales To Climb 16%

The Commerce Dept.'s "1983 Industrial Outlook" indicates car and truck sales in the US will reach 12.1 million units this year, 16% above 1982. Domestic production is projected at 9.3 million units, a 31% increase over last year. Domestic car sales could increase 19% to 6.8 million units and imports 9% to 2.4 million units, the latter figure based on the assumption that Japan will continue its import restraints through March 1984. Projections are based on a hoped for moderate decline in interest rates. By 1987, the Outlook predicts car sales could reach 7.9 million domestic units and 3.4 million import units.

Who's On First

According to a report by Paine Webber Mitchell Hutchins Inc., 1983 domestic auto market shares will be: GM 60.7%; Ford 23.7%; Chrysler 11.3%; AMC 2.5%; VWoA 1.3% and Honda 0.5%. The chart below gives domestic model mix trends through 1983.

	Subcompacts	Compacts	Intermediates	Full Size
1978	13.0%	23.9%	32.3%	29.2%
1979	21.2	23.3	28.0	26.3
1980	25.4	25.5	27.9	21.2
1981	26.8	27.0	25.5	20.7
1982*	24.3	22.7	26.8	26.2
1983E	23.5	22.0	27.5	27.0

* through Nov. E—Estimate Source: Paine Webber Mitchell Hutchins Inc.

Nissan, Toyota Projections

Toyota expects to produce 3% more vehicles this year than last, a total of 3.25 million. Home market sales, according to the company, will rise 5% to 1.6 million units. Exports are expected to dip 1% to 1.65 million. Nissan estimates its '83 domestic passenger car sales will total 882,000, up 7.8% from '82, and domestic sales of commercial vehicles will reach 302,000 units, up 5.3% from '82. Total domestic sales should be 1.184 million units, up 7.1% from last year. Nissan exports should be 1.368 million units in '83, and vehicle production in '83 should reach 2.552 million vehicles, up 6.1% from last year.

'83 R&D

Research and development for autos, trucks and parts and other transportation equipment will reach $7.19 billion in 1983, according to a forecast by Battelle's Columbus Div. Of this figure, 85.6% will be industrially funded, leaving $1.037 billion to come from the federal government. R&D growth will be about 15% above 1982 levels, projected at $6.27 billion. In 1981, $5.41 billion was spent, and in 1980, $4.84 billion. "As with any other industry, the plans for future R&D depend on sales in preceding years," a Battelle spokesman says. "An awful lot of R&D is going into cars lately, mainly as a reaction to imports and gasoline costs."

CE Exports Drop 33%

Construction equipment exports for the first nine months of 1982 plunged to $3.2 billion, down 33% below the same period in '81, according to the Construction Industry Manufacturers Association. American manufacturers shipped 83,380 pieces of CE and related components to 149 foreign nations during the first nine months of '82. During the same period in '81, 99,799 pieces were shipped. Leading purchaser Canada bought 45% less equipment during the nine month period in '82 than in '81, or a total of $425.8 million. Number two purchaser Mexico bought 60% less in '82, or a total of $209.5 million. Third-ranked Australia declined 30% to $234.3 million in the first three quarters of '82.

Exec. Recruiter Sees Late '83 Turnaround

Alan Schonberg, president of Management Recruiters International, the nation's largest executive search company, says we've probably seen the worst of Black Tuesday blues. Schonberg says there's a chance for a "meaningful" second quarter '83 recovery. More likely, however, is a third quarter turnaround which should pick up considerably in the last three months of '83 and lead to a dynamite 1984. Schonberg bases his predictions on information received from his company's 400+ offices nationwide.

HEY, IRV... I DON'T SEE ANY JAPANESE CARS IN YOUR JUNKYARD...
NOPE!
AND YOU NEVER WILL EITHER...
THE BEST JUNK IN THE WORLD IS STILL MADE RIGHT HERE IN THE GOOD OLD U.S.A.!
MAKABEE
© Jefferson Communications, Inc. 1982
Distributed by Tribune Company Syndicate, Inc.

This sour view of the US auto industry is fairly wide spread in the general media. (Reprinted by permission of Tribune Company Syndicate.)

QUALITY
THE GLITTERING PRIZE

Quality is, as John McElroy discovers, a many splendored thing. In this first of a series on that elusive word, AI delves into the what, where and how of quality, and the steps US car makers are taking to make the word once again synonymous with the land of the free and the home of the brave.

by John McElroy

Not long ago, American cars were considered among the best in the world. Today, imports are usually considered better.

To Mr. and Mrs. America, US car companies are a prime example of a dying smokestack industry—one that has lost its leadership in innovation, productivity and quality. The captains of industry will argue that it's not that bad, but some of them concede they lag behind their foreign competition.

And the result has been an ever-eroding market share in which one out of every three new cars sold is an import.

Recognizing they must retake the initiative, American automotive manufacturers have embarked on a radically different course to improve quality and productivity. These efforts are going to have a dramatic impact on their suppliers, the hourly workforce and their dealer networks. In some cases it will result in the organizational restructuring of the corporations themselves.

What Went Wrong?

A decade ago American manufacturers didn't recognize that they had quality problems—neither did their customers. Did the cars get worse or did the customers get picky?

One possible explanation relates to the inventory levels the domestic manufacturers carry. Excess inventory can lead to quality problems, basically because it hides mistakes. A quality problem may not be detected until a warehouse is brimming with bad parts (see "Making Just-In-Time Production Pay Off," Feb. '82).

During the 1970s inventory levels ballooned. This was partly due to a growing complexity of parts added for power options and emission controls. Part of it was due to a growing number of dedicated and obsolete plants and equipment. The rest resulted from the sales slump of 1974 and 1979.

Conversely, as inventory levels swelled in the US, they shrank in Japan. And this happened at the same time the public began to notice the Japanese cars offered better quality.

These facts notwithstanding, the quality experts at US firms don't believe the quality of American cars declined. Rather, they feel today's quality problems relate to consumerism, competition and the history of product development.

"The American public has become more quality conscious in everything it buys," says Larry Moore, director of product quality for Ford's manufacturing staff. "It's part of the consumerism we see. The consumer is becoming less and less tolerant of repairs, returns and marginal performance."

And George Butts, Chrysler's vice president of quality and productivity, says this growing consumerism relates directly to today's higher car prices.

"The trend to more value for the dollar was heavily stimulated by pricing," he says. "If you could buy cars and throw them away like kleenex tissues, then maybe you wouldn't be so fussy. But when it costs $8000 to $10,000 then you want the best value for your dollar."

At General Motors, Robert Decker, vice president for quality and reliability, agrees that economic forces helped place a greater emphasis on quality, but he believes Japanese competition really triggered it.

"It's foreign competition that has changed the public's priority," he notes, "and even ours. We were better than all our domestic competition; we were selling everything we could build and were making lots of money. So why change success? If it hadn't been for the Japanese, we wouldn't have changed as much or as quickly."

Yet, Phillippe Ventre, AMC's vice president of quality and product integrity, espouses a much broader and philosophical view.

"Quality is more important in the minds of the consumer today because this is the natural phase in the historical development of any product," says Ventre.

He explains that in the first, or development phase, the public is excited by a new product. To succeed, all it has to do is work. For example, in the automobile's infancy, it didn't matter if it required a hand crank or was noisy and dirty. Likewise, when television first appeared it didn't matter if it had a tiny, static filled screen.

"None of these problems matter," says

Ventre, "as long as the product works."

The second phase is what he calls the manufacturing phase. At this point competition forces improvements that provide the customer with a greater selection of products with special features, exemplified by chrome and tail fins on automobiles and color TV.

The last phase is a maturing phase in which the customer expects certain "givens" such as high fuel economy, good performance and top quality. And these expectations must be met with every product, day after day, and week after week.

Ventre believes US auto manufacturers were late in fulfilling the customer's expectations in the mature market. "It is a big mistake to say the Japanese targeted the US market as an area they should collectively take over," says Ventre. "They just happened to be in the right place at the right time with the right products."

If American manufacturers can meet the expectations of the customer in this natural phase of product development, he notes, it can regain its competitiveness.

Total Quality Control

According to these quality experts, regaining the competitive edge will require a major philosophical change in order to achieve consistently high quality levels. Quality can only result from total planning at the inception of a new project. This includes coordination among research, design, manufacturing, purchasing and service. No one group can do this on their own; they must be fully integrated.

Previously, quality control was not involved at the early stages of development, and neither was manufacturing. It was not unusual to end up with parts and components that didn't work together or to spend a year in production before the bugs were worked out of a car.

"You must not have a baton system," admonishes GM's Decker, "where the design people hand off drawings to the manufacturing people and go on to do something else.

"To do a better job of solving problems up front we now have product development teams which are responsible for a component or a whole car from the concept stage to the in-use stage. And we have review points to check for quality, reliability and durability at every stage."

GM recently merged its Advanced Product Engineering and Advanced Manufacturing staffs at the Tech Center in Warren, MI to iron out problems early in the design stages. But GM still faces the difficulty of coordinating many divisions, each with a multitude of overlapping staffs.

Ford recently moved its engineering, research and manufacturing under one command—Technical Staffs, headed by executive vice president Louis R. Ross.

At AMC, a special Quality Control Staff serves as the coordinating committee for all groups in the corporation. There are weekly meetings at the vice presidential level for all groups to coordinate their efforts on a project. The QC Staff will conduct tests at all stages of development to determine where there are problems and how to bring them to the attention of the groups which can solve them.

"It is like many small rivers that converge to form one large river," says Ventre.

Chrysler's working on a similar tributary system.

"We've busted the car into 18 big chunks, such as the engine, transmission, paint system, body alignments and so on," explains George Butts. "We have chosen the company's top experts in each of these areas to be chairman of that section. These chairmen report to a vice president who has the responsibility for four or five of those sections. Those people have been given the responsibility not only for day-to-day problems, but to project themselves into new products that will be coming three years from now so we don't make the same mistake twice.

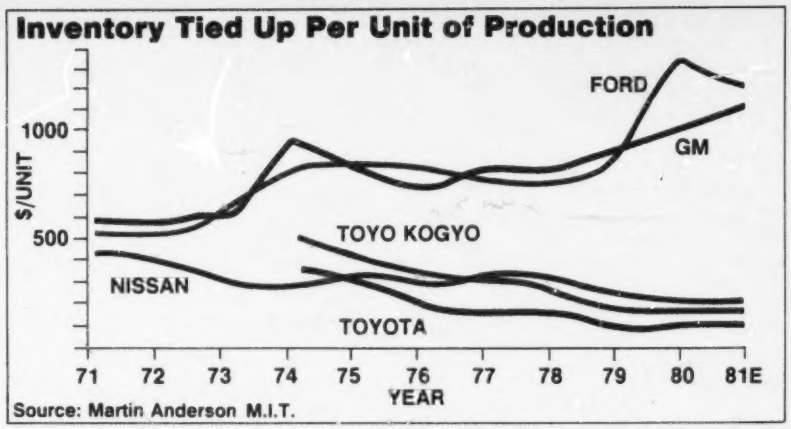
"They're responsible for setting future quality targets, and when they're not making those targets, they have to go to the top committee on quality and explain what they're going to do about it."

The 'Total' Supplier

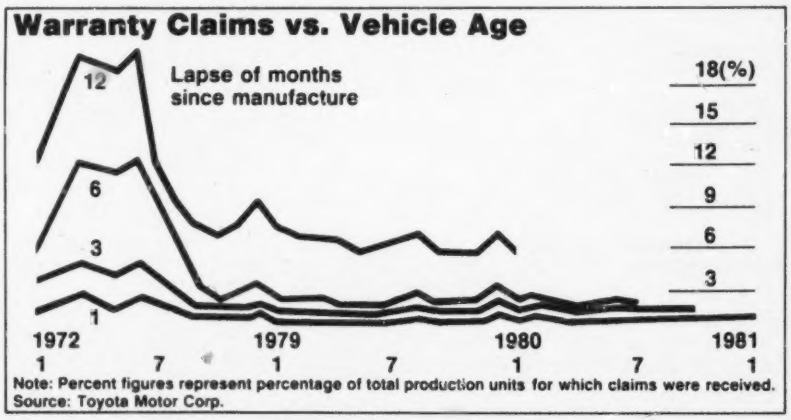
"When you talk about getting all disciplines involved in the earliest stages of design, a major element is engaging the designers with the suppliers and understanding their needs and limitations," says Ford's Larry Moore . . . which may be easier said than done.

According to AMC's Ventre, it is harder to work with the US supplier network than with European suppliers. Over there,

(Continued)



With kanban and just-in-time production, Japanese automakers were able to lower their inventory levels, which helped them improve their quality.



A good measure of efforts to improve quality can be seen in warranty costs. Toyota's warranty claims have steadily dropped throughout the last decade.

says Ventre, the suppliers are in on the development of a component.

"Here," he complains, "they get a blueprint, then quote the part and wait for a yes or no. You can't build quality in at this point. It must be designed in."

However, Ventre points out that the major suppliers understand the new change in philosophy and have adapted well on the Alliance program.

Chrysler expects to expect more from its suppliers.

"I think the day is coming when we're going to get the engineering and processing done by the suppliers," says Butts. "On a lot of parts they have the expertise, not us. There's no sense in doing a design, getting it way down the road and then turning it over to the supplier who has to change it to be able to build it. That's unproductive."

GM has established a Supplier Quality Index that rates its suppliers on a numerical basis. And Ford has a preferred supplier list through which contracts are signed with suppliers which have consistently better quality and delivery times, even though their prices might be higher. And the trend is toward fewer suppliers with longer term contracts.

"You've heard a lot of talk about having less suppliers," says GM's Decker. "Well, I don't think we're going to go out and advertise that we've eliminated this supplier or that. I think some suppliers eliminate themselves. Some of them won't do a good enough job, they won't be asked to bid anymore and they'll fall by the wayside."

Competing For Quality

In Japan, competition and recognition are used to promote and improve quality. Toyota, which first won the Deming Award in 1961, has started an in-house contest for its suppliers, which is divided into two categories—the Excellence Award and the Superiority Award.

The Excellence Award covers three areas: promoting company policy, eliminating and preventing defects, and lowering cost.

The Superiority Award is for those who have already won the Excellence Award. In addition, it covers the content of medium and long-term planning, and the goals and progress of technical development, including production engineering.

Considering Toyota's success, there are many US quality experts who believe an award system could be an excellent way to encourage American suppliers to improve their quality.

Sales & Service: Weak Link?

Quality can be measured in many ways. But the most important impact on the customer's perception of quality may be the quality of dealer service.

According to a J.D. Power survey, 41% of owners of domestic models must return their cars to the dealer two or more times because a problem is not fixed right the first time. For Honda and Toyota it is 25% and 28%, respectively.

Hopefully, this problem will begin to decline with the programs the industry is putting in place.

"We have a dealer service quality index, based on a questionnaire sent to car owners after a year," explains GM's Decker. "We can tell you the 10 best dealers in the country and the 10 worst, or the best and worst in each car division, or by region or by zone manager.

"You can really isolate the bad ones and work on them to improve. If they don't improve, then you have to tell them their dealershps are in some jeopardy."

To involve service in its Product Integrity program at AMC, the QC Staff went through shop manuals as they were being written, instead of waiting until they were printed. Then they made sure that AMC mechanics were trained to service the Alliance before it ever made it to the dealerships.

As an early warning device to monitor potential problems developing in the field, AMC has 40 dealers (representing about 15% of sales) which report daily on any and all problems with the Alliance. "Sometimes we can tell our dealers of a potential problem and the way to fix it, even before the dealer ever sees it," says Ventre.

Chrysler has just instituted a formal quality program with its dealers. Starting in January, Chrysler began auditing dealers to see how capable they are at servicing engines.

"We've brought together the complete engineering of how you should diagnose a driveability problem on an engine and sent training films to the dealers," explains Butts. "So now we're out there auditing to find out if the mechanic is really using it, and to find out if it's useful."

What is potentially the most interesting development at the dealer level could be taking place at Ford. But the details are not yet clear.

"I'm not at liberty at the moment to announce specifically what sort of changes are being made, but over the next several months you'll be hearing quite a bit more specific actions that we'll be taking with our dealer body," says Moore. "There's been a substantial amount of work being done over the past year or so to get at specific actions to address that concern."

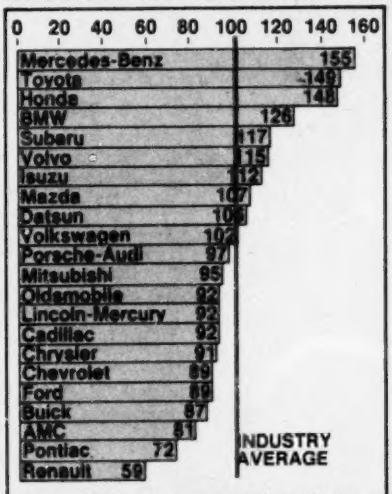
Moore hints that Ford will bring its Dr. Deming program to the dealer level and teach them statistical problem solving techniques. ■

German Inspection Ranks Quality

Rank	Make	Trouble Ratio
1.	Audi	3.7
2.	Mazda	4.3
3.	Mercedes-Benz	5.5
	Toyota	5.5
5.	Honda	5.6
6.	Opel	5.7
7.	Volvo	5.9
8.	Porsche	6.4
9.	Nissan	6.6
10.	Mitsubishi	7.2

The results of W. Germany's mandatory auto inspection program suggest that Japanese automobiles are as good as Europe's best. The trouble ratio measures the number of vehicles inspected that had to be rechecked due to serious repair problems.

The Highest & Lowest In Customer Satisfaction



Source: 1982 Customer Satisfaction Index
J. D. POWER & ASSOCIATES

The customer satisfaction index rates models according to many factors, such as problems on delivery, and overall standards of repair service. While less than half of the domestic models are problem-free at delivery, two thirds of the Japanese cars are trouble-free. European manufacturers succeed in satisfying their customers through above average after sales service.

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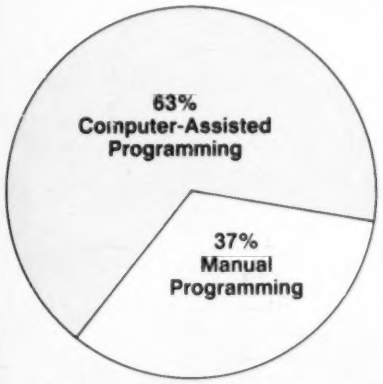
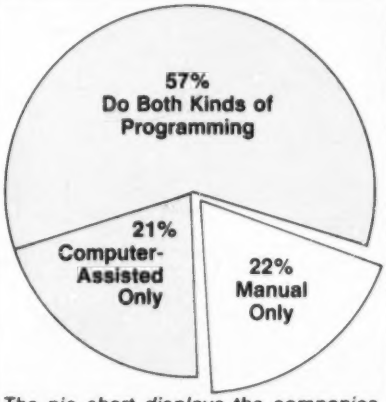
NMTBA

REPORTS TRENDS

The results are in from a National Machine Tool Builders' Assoc. survey of its membership concerning numerical control (NC) part programming. The report, developed by the association's NC Software Committee, indicates the growing importance of computer assistance in NC part programming.

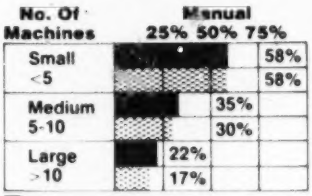


Computer assistance has taken nearly a 2 to 1 edge over manual programming techniques in NC part programming, according to the survey. John B. Deam, technical director of NMTBA, claims it's a trend which should increase in the future.



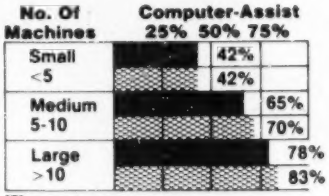
The pie chart displays the companies which use manual programming only, computer assisted only, or a combination of the two. One out of every five installations use manual programming only. According to NMTBA's Deam, the manual-only portion of the pie will gradually shrink during this decade.

Manual Programming Done More By Small Users Of NC Machines.



■ By Size Of Installation

Computer-Assist Programming Tends To Increase As More NC Equipment Is Used.



▨ Machine Weighted

The Machine Weighted Factor Follows The Same Trend In Both Charts.

These charts show the amount of computer assistance by size of installation. It also displays the share of programming when calculated on a machine weighted basis. For example, an installation which has twice as many NC machines would be weighted twice as heavily in calculating the average. The survey also indicates that the larger the size of the installation, the more likely it is that at least some computer assistance will be used.

Note: According to the report, a small installation has fewer than five NC machine tools; a medium sized installation has between five to ten machine tools; and a large installation has more than ten machine tools installed.

The survey was directed to NMTBA's approximately 400 member companies. The committee received 95 usable responses. And while the automakers weren't surveyed, NMTBA suggests the data is sufficiently representative of all classes of users that the results will be found to be informative, as well as useful to all. ■

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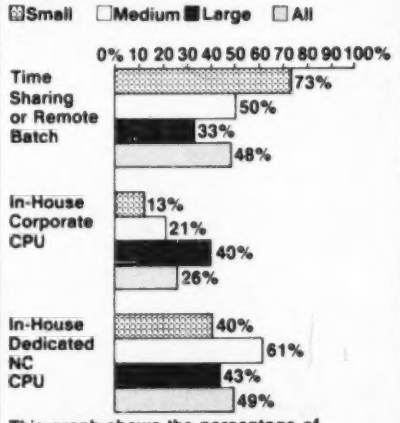
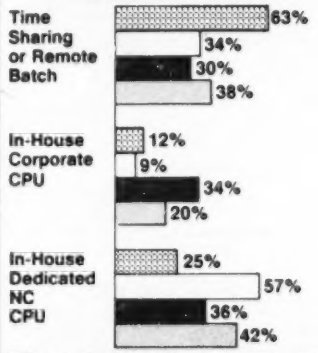
COMPUTER-ASSISTED PROGRAMMING MEANS

USAGE BY INSTALLATION



This graph shows the percentage of installations that use at least 5% of a given technique. (Note that many installations use more than one technique.)

DISTRIBUTION OF TOTAL USAGE



This graph shows the average usage of each technique on a percentage basis.

The survey quotes half of all respondents use time sharing or remote batch computer assistance techniques. The study also reveals that there's a definite trend towards the use of in-house computers—some companies will use in-house dedicated computers while a smaller percentage will use in-house corporate computers.